REMARKS

This is intended as a full and complete response to the Office Action dated January 21, 2010, having a shortened statutory period for response set to expire on April 21, 2010. Claim 6 has been cancelled without prejudice. Claims 1, 2, 5, 8 and 17 have been amended to more clearly recite various aspects of the invention. Applicants reserve the right to subsequently take up prosecution of the claims as originally filed in this application in a continuation, a continuation-in-part and/or a divisional application. Applicants believe no new matter has been introduced by the amendments presented herein. The amendments have been made in a good faith effort to advance prosecution on the merits. Please reconsider the claims pending in the application for reasons discussed below.

Claims 1-20 stand rejected under 35 U.S.C. § 101 as being directed to non-statutory subject matter. Claims 1 and 17 have been amended to now include "using a computer." Support for the amendments may be found throughout the specification, including paragraphs [0036]-[0039]. (See patent application publication no. 2008/0043573). In this manner, claims 1 and 17 are tied to a computer which qualifies as a particular machine or apparatus. Therefore, claims 1 and 17 are therefore directed at patentable subject matter. Claims 2-5, 7-16 and 18-20 are also direct to patentable subject matter since they depend from claims 1 and 17. Withdrawal of the rejection is respectfully requested.

Claims 1, 11-13 and 16-20 stand rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 4,887,243 ("Pann"). Pann is generally directed toward removing multiple surface reflection events from seismic data by convolving pairs of real seismic traces having end points in common with a trace being analyzed. (See Pann, Abstract). Claim 1 has been amended to now include "computing, using a computer, at least one of a desired shot-side midpoint, offset and azimuth, and at least one of a desired receiver-side midpoint, offset and azimuth based on a selected target trace and a selected potential downward reflection point, wherein the desired shot-side midpoint, offset and azimuth define a desired shot-side trace and the desired receiver-side midpoint, offset and azimuth define a desired receiver-side trace." Support for the

amendment may be found throughout the specification, including paragraph [0027] and was previously recited in claim 6. The Examiner did not provide any arguments with regard to whether Pann teaches all the limitation of claim 6. However, Applicants assume that the Examiner intended to reject claim 6 using the same arguments provided in the similar limitation recited in claim 17. (See office action, page 4, lines 8-13). As such, for purposes of this response, claim 6 will be treated as being rejected for the same reasons cited for claim 17. With regard to claim 17, the Examiner takes the position that Pann teaches the above recited limitation in columns 4-5. (See office action, page 4, lines 8-13). The relevant portions of Pann are provided below for the Examiner's convenience.

> The present invention presupposes that the wave recorded as trace SR is the sum of a primary wave and one or more multiple waves. The primary reflection of the wave recorded by trace 42 is shown at 42a on the trace. It corresponds to the direct path taken by the acoustic wave input to the earth and received at a receiver after a single reflection from an interface between materials of various acoustic impedances. Only a single ripple 42a indicating detection of the primary reflection is shown. It will be appreciated that typically such traces record numerous such primary reflections corresponding to the number of interfaces at which reflection of the primary wave occurs. However, for the purposes of understanding the invention, only a single primary reflection need be considered. The remainder of the reflections recorded by trace 40 are multiples which are shown separately on trace 44; that is, **the assumption is made that the trace 40 shows the sum of the primary reflection on trace 42, and of the multiples on trace 44**. The assumption is then made that the reflections on multiple trace 44 are effectively the sum of two primary reflections which are shown on traces 46 and 48, **these being the traces recorded with respect to waves between the source S and the location C at the surface of the sea at which the multiple reflection takes place, and between point C and the receiver location R**. Accordingly, the overall received trace 40 is equal to the sum of the trace 42 plus the sum of two traces occurring between point C on the surface and the source and receiver locations S and R, respectively. These real traces (which will be referred to hereafter as SC and CR) will have typically been recorded in the course of the exploration operation, i.e., CR when the vessel is at C and SC in connection with the same "shot" as the wave SR under analysis. The difficulty is in accurate location of the point C at the surface from which the multiple reflection occurs. However, while point C can be located according to the present invention it need not be in order to remove multiples from a seismic record.
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> **...**

> The present application utilizes Huygens' Principle of Wave Propagation, which states that a wave traveling in any medium or combination of media between two fixed points will take that path which yields the shortest possible total travel time. This physical principle is coextensive with Snell's Law, which is used in ray tracing. However, it simplifies matters in cases where the precise configuration of the various interfaces between the media are not known, as here. **Instead, all possible pairs of primary ray paths can be combined and the travel time measured for each. That pair of real ray paths which has the shortest travel time will be that along which the multiple actually travels.**
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> It will be appreciated that this method provides the actual multiple path taken regardless of the shape of the ocean bottom and of the interfaces between the subsea beds, because these control the real multiple and the individual primary reflections which are summed to generate the synthetic multiple in an identical way.
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> In carrying out the process of the present invention, **the actual path undergone by a multiple from a source location S to a receiver location R is determined by combining pairs of traces having a common beginning and ending point in the interval between S and R.** (In this specification, the term "combining" pairs of waves to form a synthetic trace means convolution or a similar mathematically appropriate procedure.) If all possible pairs of traces combined in this region, that convolved pair with a reflection having the shortest total travel time has the same path as the multiple between S and R. **Accordingly, in order to determine the actual multiple path between S and R, one combines pairs of traces, in which one of each pair is recorded with respect to a source at some point C in the interval between S and R and a hydrophone at point R, and the other is recorded with respect to a source at S and a hydrophone at the same point C, and determines which of all these combined traces has the minimum total travel time.**
> (See Pann, column 4, line 44 – column 5, line 66, Emphasis Added).

As shown above, Pann does not teach computing at least one of a **desired shot-side midpoint, offset and azimuth**, and at least one of a desired receiver-side **midpoint, offset and azimuth** based on a selected target trace and a selected potential downward reflection point, wherein the desired shot-side midpoint, offset and azimuth **define a desired shot-side trace** and the desired receiver-side midpoint, offset and azimuth **define a desired receiver-side trace**, as recited in claims 1 and 17. In contrast, Penn combines pairs of traces that have common beginning and ending points between the source and receiver. In this manner, Penn's traces are not determined by computing at least at least one of a **desired shot-side midpoint, offset and azimuth**,

and at least one of a desired receiver-side **midpoint, offset and azimuth**. In fact, Pann does not mention a midpoint, offset and azimuth, let alone that the midpoint, offset and azimuth defines the desired shot-side trace and the desired receiver-side trace anywhere in its disclosure. Likewise, since Pann does not teach the desired shot-side trace and the desired receiver-side trace, Pann cannot teach identifying each pair of recorded traces that is substantially closest to the desired shot-side trace and the desired receiver-side trace, as recited in claims 1 and 17.

For these reasons, claims 1 and 17 are patentable over Pann. Claims 11-13, 16 and 18-20 are also patentable over Pann since they depend from claim 1 and 17. Withdrawal of the rejection is respectfully requested.

Claims 14-15 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Pann in view of U.S. Patent No. 6,094,620 ("Gasparotto"). Neither Pann nor Gasparotto, alone or in combination, teaches or discloses "computing, using a computer, at least one of a desired shot-side midpoint, offset and azimuth, and at least one of a desired receiver-side midpoint, offset and azimuth based on a selected target trace and a selected potential downward reflection point, wherein the desired shot-side midpoint, offset and azimuth define a desired shot-side trace and the desired receiver-side midpoint, offset and azimuth define a desired receiver-side trace," as recited in claim 1. Since claims 14-15 depend from claim 1 and since neither Pann nor Gasparotto, alone or in combination, teaches, discloses or suggests all the limitations of claim 1, claims 14-15 are therefore also patentable over Pann and Gasparotto. Withdrawal of the rejection is respectfully requested.

With regard to claims 2-5 and 7-10, the Examiner has not provided any arguments as to whether these claims are taught by either Pann or Gasparotto. Nevertheless, since neither Pann nor Gasparotto, alone or in combination, teaches or discloses all the limitation recited in claim 1, and since claims 2-5 and 7-10 depend from claim 1, claims 2-5 and 7-10 are patentable over Pann and Gasparotto.

In conclusion, the references cited by the Examiner, neither alone nor in combination, teach, show, or suggest the claimed invention. Having addressed all issues set out in the office action, Applicants respectfully submit that the claims are in condition for allowance and respectfully request that the claims be allowed.

The prior art made of record is noted. However, it is believed that the secondary references are no more pertinent to the Applicants' disclosure than the primary references cited in the office action. Therefore, it is believed that a detailed discussion of the secondary references is not deemed necessary for a full and complete response to this office action. Accordingly, allowance of the claims is respectfully requested.

Respectfully submitted,

/Ari Pramudji/ April 15, 2010
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